Richmond Journal of Law and Technology

Volume 11 | Issue 1 Article 3

2004

An Introduction to Artificial Intelligence and Legal Reasoning: Using xTalk to Model the Alien Tort Claims Act and Torture Victim Protection Act

Eric Allen Engle

An Introduction to Artificial Intelligence and Legal Reasoning: Using xTalk to Model the Alien Tort Claims Act and Torture Victim Protection Act

Eric Allen Engle [*]

Cite as: Eric Allen Engle, *An Introduction to Artificial Intelligence and Legal Reasoning: Using xTalk to Model the Alien Tort Claims Act and Torture Victim Protection Act*, 11 RICH. J.L. & TECH. 2 (2004), *at* http://law.richmond.edu/jolt/v11i1/article2.pdf.

Abstract: This paper presents an introduction to artificial intelligence for legal scholars and includes a computer program that determines the existence of jurisdiction, defences, and applicability of the Alien Tort Claims Act and Torture Victims Protection Act. The paper includes a discussion of the limits and implications of computer programming in formal representations of the law. Concluding that formalization of the law reveals implicit weaknesses in reductionist legal theories, this paper emphasizes the limitations in practice of such theories.

[*] Eric Allen Engle (J.D. St. Louis, D.E.A., Paris X, D.E.A. Paris II, LL.M. Bremen) teaches law at the Universität Bremen, Germany where he is pursuing an M.Sc. in computer science. His publications can be seen online and at Westlaw. His personal website is: http://lexnet.bravepages.com
.

TABLE OF CONTENTS

I. INTRODUCTION: THE PROBLEM OF LEGAL COMPLEXITY

[1] The law is ubiquitous. Jurists are confronted with thousands of statutes and interpretive federal and local government cases. Thus, law professors try to teach legal scholars the basic principles that apply to all types of legal practice, attempting to enable them to tame the mass of rules they will confront as practitioners and to "think like lawyers." The law is complex – a Byzantine labyrinth of rules, exceptions, and exceptions to the exceptions.

[2] This characterization is certainly true of private international law and civil procedure. Both areas are complex, and some may consider them to be boring; yet, procedure is crucial to law practice. Substantive rules stem from national, international, regional, federal and local sources. These substantive rules must then be applied in domestic courts subject to equally diverse procedural rules, rapidly resulting in dizzying complexity. This complexity is somewhat offset by the mechanical and straightforward nature of the rules of civil procedure: Although there are many procedural rules, the rules are determinate (few in number and reaching precise results). The procedural rules, at least, follow basic mechanical formulas with Boolean true/false outcomes that result from conjunctions and disjunctions of conditionals. Such formulas lend themselves well to modelling by computer. This paper discusses modelling the law by computer.

II. ARTIFICIAL INTELLIGENCE ("AI"): A SOLUTION TO THE PROBLEM OF LEGAL COMPLEXITY?

[3] Computer applications for legal problem-solving have progressed from mere text editors to case law research to automated form generation.[1] Today we see computers used as intelligent agents[2] tasked with solving specific legal problems.[3] Can artificial intelligence solve legal problems? Will the ability of computer programs to solve legal problems have real life applications, or is it merely an intellectual

[1] *See* Russell Allen & Graham Greenleaf, *Introduction to Inferencing*, UNSW LAWS 3035 Computerisation of Law, http://aide.austlii.edu.au/documentation/inferencing.introduction/ (last updated March 3, 2001) (providing a discussion on the possibilities and limitations of knowledge-based technologies when applied to law).

[2] *See* STUART RUSSELL & PETER NORVIG, ARTIFICIAL INTELLIGENCE: A MODERN APPROACH 7 (Prentice Hall 1995) (defining "agent" as a person or thing that, given inputs ("perceptions"), generates appropriate outputs ("actions")).

[3] *See, e.g.*, Muhammed A.R. Pasha & Paul Soper, *Combining the Strengths of Information Management Technologies to Meet the Needs of Legal Professionals*, 2 J. INFO., L. & TECH. 1 (1996), *at* http://elj.warwick.ac.uk/jilt/itpract/2pasha/.

curiosity? To what extent and in what ways can artificial intelligence help real lawyers with real legal problems?

[4] Computer programs can indeed solve legal problems. The fact that computer programs can model law is not necessarily simply of academic interest. Automated case research is one potential application of intelligent programs. When artificial intelligence determines a solution to a legal problem, it could then automatically fetch relevant cases from online or off-line statutory and case law databases.[4] "Spiders"[5] crawl through online databases all the time; why not adapt this technology to law?

[5] Efforts have been made to use computer programs for automated search and retrieval from legal databases.[6] Computer intelligence can also be used as a backstop to keep lawyers from missing obvious issues and to provide potential lines of argument and defences to the litigator. Using the computer as a backstop is far from using the computer as a judge; however, automated search and retrieval, as well as check-listing a lawyer's work, are tasks well within the computational power of contemporary machines.[7]

[6] Because procedural rules are mechanical, they lend themselves to computer modelling. The complex yet mechanical nature of procedural laws, particularly in the context of international law, explain why computer modelling of complex mechanical rule structures such as civil procedure, conflicts of laws/private international law may be a useful tool for practitioners. The computer

[4] *See, e.g.,* Jeffery S. Rosenfeld, *Nuts & Bolts: Legal Research*, THE ADVOCATE (Md. State Bar Ass'n Young Lawyers Section), Fall 2002, at 3 (discussing the benefits of automated research tools such as Eclipse and Westclip), http://www.yls.org/sec_comm/yls/advocate/fall02/bolts.html (last visited Sept. 5, 2004).

[5] Synonymous with a crawler, this is a program that searches the Internet and attempts to locate new, publicly accessible resources, such as WWW documents, files available in public FTP archives, and Gopher documents. Also called wanderers or bots, spiders contribute their discoveries to a database that Internet users can search by using a search engine. Spider technology is necessary because the rate at which people are creating new Internet documents greatly exceeds any manual indexing capacity (although search directories prefer the manual approach). NetLingo Dictionary of Internet Words: A Glossary of Online Jargon With Definitions of Terminol, *at* http://www.netlingo.com/right.cfm?term=spider (last visited July 13, 2004).

[6] *See, e.g*., Sandip Debnath et al., *LawBOT: A Multiagent Assistant for Legal Research*, 4 IEEE INTERNET COMPUTING ONLINE, No. 6, Nov.-Dec. 2000, at 32-37, *at* http://csdl.computer.org/comp/mags/ic/2000/06/w6032abs.htm (last updated July 8, 2004).

[7] *See generally* John Aikin, *Computers and Human Reason*, WASH. STATE ASS'N OF DATA PROCESSING MANAGERS NEWSL. (Info. Processing Mgmt. Ass'n), July 1, 1977 (reviewing JOSEPH WEIZENBAUM, COMPUTER POWER AND HUMAN REASON: FROM JUDGMENT TO CALCULATION (W.H. Freeman & Co. 1976) (discussing the use of computers to automate judicial decisionmaking), http://www.ipma-wa.com/news/1977/197707.htm (last updated Sept. 4, 2004).

is less likely than a human to overlook any of the Byzantine exceptions or exceptions to exceptions that may result in the application or non-application of a foreign or domestic procedural or substantive law. Computers are not more intelligent than humans. Humans are far more creative than the computer programs that they write. Computers, however, are more systematic and less prone to error in simple repetitive tasks than humans.[8] This author is of the opinion that artificial intelligence can play a useful legal role as a diagnostic and a checklist. Artificial intelligence can act as backstop for human reasoning to prevent human error, such as oversight or omission of potential claims and defences, and guide potential lines of argument.

A. Basic Computing Concepts

1. Expert Systems

[7] Artificial intelligence programs can be divided into programs that are general or expert systems of intelligence. General systems are computer programs that attempt to simulate intelligence generally, or with no fixed limited class of problems.[9] Consequently, programming a general system can be very difficult. Further, because general systems are relatively impractical, they are rare.[10] In contrast, an expert system is a computer program geared toward solving one limited class of problems. Expert systems infer implications from a given knowledge base.[11] This knowledge base may be static, pre-programmed and unchanging, or dynamic and capable of evolution.[12] Dynamic rule bases may be better at representing intelligence since the evolution of the rule base reflects the program's ability to "learn." Programs that play chess generally use static rule bases, though some chess-playing programs use dynamic rules and adapt themselves to

[8] *See, e.g.*, Jake Freivald & Eric Greisdorf, *The iWay Security Exchange*, 2002, at 9, *at* http://www.iwaysoftware.com/products/ pdf/iWay_Security_Exchange_WP1.pdf (last visited Sept. 14, 2004) (providing a discussion of integration technologies).

[9] *See, e.g.,* BEN COPPIN, ARTIFICIAL INTELLIGENCE ILLUMINATED 259 (Jones & Bartlett 2004) (comparing frame-based representational systems with expert systems).

[10] *See* Marc Lauritsen, *Smart Pads on the Wireless Web*, 29 L. PRAC. MGMT. No. 8, 2003, at 31, 32 (stating that general, as well as expert, systems have had few commercial applications and are generally still in the developmental stage).

[11] *See, e.g.*, PC AI Glossary of Terms (2001-2002), *at* http://www.pcai.com/web/glossary/pcai_d_f_glossary.html#Expert_Systems (last visted Sept. 5, 2004).

[12] Stephen J. Hegner, *Representation of Command Language Behavior for an Operating System Consultation*, Proceedings of the Fourth IEEE Conference on Artificial Intelligence Applications (March 1988) at 50-55, http://www.cs.umu.se/~hegner/Publications/PDF/caia88.pdf (last visited Sept. 4, 2004).

their opponent.[13] Most artificial intelligence applications, including law applications, are formulated as rule-based expert systems.[14] But just what is that intelligence trying to model? How does the human brain actually work, and to what extent does it work differently than the computer?

2. Analog v. Digital Processing

[8] Neuroscience[15] has now determined what computer science has surmised,[16] that human brains and most computers operate quite differently.[17] Specifically, human brains appear to be analog,[18] whereas contemporary computers are nearly always digital. While today's microprocessors almost universally represent knowledge in binary states (true/false; yes/no; on/off), humans represent knowledge in analog states (warmer/colder; brighter/darker).[19] While analog computers are possible (for example, a slide rule is an analog computer),[20] virtually all of today's microprocessors are digital because a sufficiently fine digital representation is indistinguishable from an analog representation, and it is also easier to store and transmit.[21]

---

[13] *See, e.g.,* Jonathan Baxter et al., *Learning to Play Chess Using Temporal Differences, in* 40 MACHINE LEARNING 243, 243-63 (2000), *at* http://cs.anu.edu.au/people/Lex.Weaver/pub_sem/publications/MACH1451-98.pdf.

[14] Michael Aikenhead, *A Discourse on Law and Artificial Intelligence*, 5 L. TECH. J. 1 (June 1996), http://www.law.warwick.ac.uk/ltj/5-1c.html (published on the web in Feb. 1997).

[15] *See* Bruno B. Averbeck et al., *Parallel Processing of Serial Movements in Prefrontal Cortex*, 99 PNAS 20, 13172–77 (2002) (providing an interesting comparison of parallel and serial brain functions in monkeys), http://www.pnas.org/cgi/reprint/99/20/13172.pdf (last visited Oct. 4, 2004).

[16] *See* John R. Searle, *Is the Brain a Digital Computer?*, http://philosophy.wisc.edu/shapiro/Phil554/PAPERS/Is%20the%20Brain%20a%20Digital%20Computer.htm (last visited Sept. 5, 2004) (discussing and comparing brain processes and computational operations).

[17] *See* Eric J. Lerner, *The Music of the Brain,* 21STC No. 4.2 (1999), http://www.columbia.edu/cu/21stC/issue-4.2/lerner.html (last visited Sept. 5, 2004) (positing that while ten years ago the dominant analogy for the brain was the digital computer, the brain today is understood to be more of a symphony or a chorus).

[18] Analog data is continuous (a range of values) and digital data is binary (on-off). *See* Computer User High-Tech Dictionary, *at* http://www.computeruser.com/resources/dictionary/popup_definition.php?lookup=1524 (last visited Sept. 2, 2004).

[19] Stephen J. Gislason, M.D., *The Brain as an Analogue Computer*, *in* THE BOOK OF EXISTENCE AND THE HUMAN MIND (1997), http://www.nutramed.com/Philosophy/analog_computer.htm (last visited Sept. 5, 2004).

[20] Andrew Grygus, Automation Access, *History*, *at* http://www.aaxnet.com/info/hist.html (last visited Sept. 5, 2004).

[21] *See generally* Herbert M. Sauro, *Analog Computers*, *at* http://www.cds.caltech.edu/~hsauro/Analog.htm (last visited Oct. 4, 2004); Fact Monster, *Analog Computers*, *at* http://www.factmonster.com/ce6/sci/A0857505.html (last visited Oct. 4, 2004) (discussing the modern pervasiveness of digital computers as compared with analog computers).

3. Serial and Parallel Processing

[9] A computer and the human brain are not only different because the right hemisphere of the brain functions using analog principles but also because the human brain is a massive parallel processor ("MPP").[22] While it is possible to emulate parallel processing using several networked Central Processing Units ("CPUs"),[23] none of the major desktop CPUs use parallel processors.[24] In parallel processing, one part of the brain (or one CPU) works to solve a problem at the same time as another part (or a different CPU) works on the same problem.[25] The parts of the brain then compare answers, and if they agree, the brain then moves to the next step.

[10] Although the above explanation of the human brain and parallel processing is simplified, it does explain how the human brain works. The brain tries to get an answer. If it finds no answer to the current problem, it either backtracks to an earlier answer or skips forward to a new problem, hoping that by solving the other problem it will gain insights on the skipped problem. At the same time the brain is forward and backward chaining its search tree, the brain is also comparing search strategies by a dialogue between the left (execution) and right (creative) hemispheres.[26] Thus, the brain, unlike most computers, is engaging in parallel processing.[27]

---

[22] The brain seems to be a computer with a radically different style. For example, the brain changes as it learns, it appears to store and process information in the same places . . . . Most obviously, the brain is a parallel machine, in which many interactions occur at the same time in many different channels. *See* The University of Alberta's Cognitive Science Dictionary, *at* http://www.psych.ualberta.ca/~mike/Pearl_Street/Dictionary/dictionary.html (last visited Sept. 5, 2004) (defining "artificial intelligence") (citing P.S. Churchland, *From Descartes to Neural Networks*, SCIENTIFIC AMERICAN, July 1989, at 100).

[23] "Parallel Processing refers to the concept of speeding-up the execution of a program by dividing the program into multiple fragments that can execute simultaneously, each on its own processor. A program being executed across *n* processors might execute *n* times faster than it would using a single processor." Hank Dietz, *Parallel Processing Using Linux*, *at* http://yara.ecn.purdue.edu/~pplinux/ (last modified April 28, 1999).

[24] *See, e.g.*, Balluff, *Identification Made Easy: The Parallel Processor*, *at* http://www.balluff.com/parallelprocessor/BISC_605.pdf (last visited Sept. 5, 2004) (describing the 605 parallel processor).

[25] *See generally* Search390.com, *Parallel Processing*, *at* http://search390.techtarget.com/sDefinition/0,,sid10_gci212747,00.html (last modified April 30, 2003) (discussing various algorithms used in parallel processing).

[26] *See, e.g.*, Erik T. Mueller, *Story Understanding*, *in* ENCYCLOPEDIA OF COGNITIVE SCIENCE (Macmillan Reference, 2002), http://xenia.media.mit.edu/~brooks/storybiz/ECSStoryUnd.doc (last visited Sept. 13, 2004) (discussing story understanding researchers' investigation of how the human brain understands stories).

[27] The University of Alberta's Cognitive Science Dictionary, *supra* note 22 (defining "parallel distributed processing").

[11] The vast majority of computer processors today are not parallel processors; instead, they are serial processors.[28] In fact, a microprocessor is simply a very fast and perfectly accurate adding machine (the CPU) with several abaci[29] attached to store results (the "registers").[30] Microprocessors, at present, are not at all creative. On the other hand, microprocessors tend not to forget, at least until you pull the plug.[31]

[12] Unlike the brain which has at least two processors (namely the left and right hemispheres), computers today do not generally assign a problem to two different CPUs[32], skip backwards and forwards in aleatory searches for tentative solutions to interrelated problems, or periodically compare the processing to other CPUs.[33] The right hemisphere of the brain handles creative, holistic tasks and the left hemisphere is dedicated to linear computation.[34] Most computing is not done in parallel. Instead, one main chip and possibly a math co-processor do all the calculations in a linear fashion. The machine will always return to whatever it is told to return. Current chip technology and software do not include native creative functions other than pseudo-random numbers generated by reference to the computer's clock.[35] Contemporary CPUs, like their predecessors twenty years ago, are simply blindingly fast and nearly infallible adding machines that are able to compare and store values.

---

[28] Robert D. Bliss & Lloyd G. Allred, *The Wrong Chip*, http://hummer.larc.nasa.gov/acmbexternal/Personnel/Storaasli/images/wrongchip.html (last visited Sept. 5, 2004) (summarizing highlights of a presentation "Moving to the Parallel Universe," given by Bliss and Allred to the Software Technology Conference, May 2, 2001).

[29] *See generally* Luis Fernandes, Abacus, *A Brief Introduction to the Abacus*, http://www.ee.ryerson.ca:8080/~elf/abacus/intro.html (last modified Nov. 27, 2003).

[30] A register is one of a small number of high-speed memory locations in a computer's CPU. The Free Dictionary.com, *at* http://computing-dictionary.thefreedictionary.com./register (last visited Oct. 4, 2004).

[31] Although ordinary random access memory ("RAM") is volatile and does not retain information when the current is cut off, Flash RAM and electronically programmable read only memory ("EPROM") retains information even when the current is cut off. *See, e.g.,* Mark J. Sebern, *What Is Flash RAM?*, *at* http://people.msoe.edu/~sebern/courses/cs400/team1/flash.htm (last modified Oct. 10, 1996) (summarizing the key points and the advantages of Flash memory).

[32] The Glossary For Internet Service Providers, *at* http://isp.webopedia.com/TERM/C/CPU.html (last visited Aug. 27, 2004) (defining the term "CPU" as the "brains of the computer").

[33] Webopedia Computer Dictionary, *at* http://www.webopedia.com/TERM/P/parallel_processing.html (last visited Oct. 4, 2004) (defining "parallel processing" as "the simultaneous use of more than one CPU to execute a program").

[34] Włodzisław Duch, How Does the Brain Work?, Lecture at the Univ. of Tokyo (Apr. 14, 2000), http://www.phys.uni.torun.pl/~duch/ref/00-how-brain/ (last visited Oct. 4, 2004).

[35] *See, e.g.,* Dallas Semiconductor Maxim, *Pseudo-Random Number Generation Routine for the MAX765x Microprocessor*, *at* http://www.maxim-ic.com/appnotes.cfm/appnote_number/1743 (last updated Sept. 25, 2002).

[13] Of course, it is possible to do parallel processing with software using networked computers. Although this was not the origin of computing, it may be the future.[36]

[14] Serially processing data,[37] or thinking like a traditional serial microprocessor, is essentially a linear function. The serial processor steps through each command sequentially. Commands are run only sequentially, and results are not compared to the results of outside processors. Computers may evolve toward parallel processing, as we can already see in distributed computing applications such as SETI.[38] However, very little work has been done on programming computers to emulate human creativity, other than generating random art[39] or random poetry.[40] Perhaps this is due to the fact computer scientists tend to think sequentially, whereas artists tend to think holistically.

B. Artificial Intelligence

[15] Artificial intelligence ("AI")[41] has evolved sporadically and, despite remarkable initial work, has stagnated to some extent. AI guru Marvin Minsky recently stated in a speech at Boston University that "AI has been brain-dead since the 1970s."[42] AI's "brain-death" is not

[36] For articles on parallel processing, see generally *Parallel Processing Letters (PPL)*, WORLD SCIENTIFIC, Sept. 2003, http://www.worldscinet.com/ppl/ppl.shtml (last visited Oct. 4, 2004).

[37] For a brief history of the evolution of serial processing toward parallel processing, see generally Mary Ellen Weisskopf, *Course Notes for CS 690: Operating Systems*, http://www.cs.uah.edu/~weisskop/osnotes_html/M1.html (last visited Oct. 4, 2004).

[38] The SETI@home screen-saver project is the world's largest distributed computer program. Thomas Pierson, *SETI and Astrobiology* (May 29, 2003), *at* http://www.seti.org/about_us/info_for_media/backgrounders/seti_and_astro.html (last visited on Sept. 5, 2004).

[39] *See* Mike King, *Artificial Consciousness – Artificial Art*, Sixth International Symposium on Electronic Art, 1995, at 137-40, http://www.jnani.org/mrking/writings/earts/artpanel.html#text31 (last visited Aug. 26, 2004) (citing John Lansdown, *Artificial Creativity: An Algorithmic Approach to Art*, Proceedings of the First Conference on Computers in Art & Design Education, University of Brighton, April 18-21, 1995, at 31-35 (explaining that randomness is a significant element in the generation of computer artwork).

[40] *See, e.g.*, Sherry Nelson, *The Random Poetry Generator*, *at* http://www.geocities.com/sherry_a_nelson/poem.html (last visited on Aug. 26, 2004).

[41] For a brief history of artificial intelligence and law, see generally Graham Greenleaf, Legal Expert Systems – Robot Lawyers?: An Introduction to Knowledge-Based Applications to Law, Lecture at the Australian Legal Convention in Sydney (Aug. 1989), http://www2.austlii.edu.au/cal/papers/robots89/ (last visited Aug. 26, 2004). For a similar article off-line, see generally Robert Moles & Bib Sangha, *Logic Programming - An Assessment of Its Potential for Artificial Intelligence Applications in Law,* 2 J. LAW & INFO. SCI.1 (1991), http://web.archive.org/web/20020401072624/law.uniserve.edu.au/law/pub/compute/logic/ (last visited on Aug. 26, 2004).

[42] Mark Baard, *AI Founder Blasts Modern Research*, WIRED NEWS, May 13, 2003, at 1, *at* http://www.wired.com/news/technology/0,1282,58714,00.html (last visited on Aug. 26, 2004). Minsky co-founded the MIT Artificial Intelligence Laboratory in 1959 with John McCarthy. *Id.*

due to any computational limits, but is simply due to the fact that other problems were more profitable. However, profitable areas of AI, such as machine translation, have indeed kept pace with other programming achievements of the last several decades.[43]

1. Alan M. Turing

[16] Early computer scientists originally thought that artificial intelligence would be the defining characteristic of computational power.[44] Alan M. Turing proposed that machine intelligence would be considered "intelligent" to the point where a user would not know the difference between the machine and a person.[45] The "Turing Test" has since generated much scholarship[46] and some criticism for concealing as much as it reveals.[47] The ability to mimic a human successfully has not, in fact, turned out to be the *sine qua non* of computer intelligence. The famous computer program "Eliza" demonstrates this development.

2. "Eliza"

[17] "Eliza" was one of the first successful attempts at creating a machine that could interact with a human.[48] Eliza was intended to

[43] Machine translation (MT) is the application of computers to the task of translating texts from one natural language to another. One of the very earliest pursuits in computer science, MT has proved to be an elusive goal, but today a number of systems are available which produce output which, if not perfect, is of sufficient quality to be useful in a number of specific domains. Ron Brachmann, *Machine Translation*, *at* http://www.aaai.org/AITopics/html/machtr.html (last visited Aug. 27, 2004); Thijs Westerveld et al., *Extracting Bimodal Representations for Language-Based Image Retrieval*, *in* Multimedia 1999, Proceedings of the Eurographics Workshop (2000), at 33-42, http://homepages.cwi.nl/~thijs/pub/egmm.pdf (last visited on Aug. 27, 2004).

[44] For the first conference devoted to the study of artificial intelligence (and one of the defining moments of post-war computation), see J. McCarthy et al., *Proposal for the Dartmouth Summer Research Project on Artifical Intelligence*, Dartmouth College, Aug. 31, 1955, http://www-formal.stanford.edu/jmc/history/dartmouth/dartmouth.html (last visited Aug. 27, 2004). *See also* Bruce Buchanan, *A Brief History of Artificial Intelligence* (2002), *at* http://www.aaai.org/AITopics/bbhist.html (last visited Aug. 27, 2004).

[45] *See* Alan Turing, *Computing Machinery and Intelligence*, 59 MIND 433, §§ 1, 6, 7 (1950) (considering whether machines can think), *available at* http://www.abelard.org/turpap/turpap.htm (last visited on Sept. 5, 2004).

[46] For a bibliography with complete online references, see Ayse Pinar Saygin, *The Turing Test Page*, *at* http://cogsci.ucsd.edu/~asaygin/tt/ttest.html (last updated Oct. 27, 2003).

[47] *See* Robert Moles & Bibi Sangha, *Computer Systems - and Legal Reasoning?* (1999) (on file with the *Richmond Journal of Law & Technology*). *See generally* Robert M. French, *Subcognition and the Limits of the Turing Test*, 99 MIND 53, 53 (1990) (arguing that the Turing Test's capacity to probe the most essential areas of human cognition makes it virtually useless as a real test for intelligence), *available at* http://www.ulg.ac.be/cogsci/rfrench/turing.pdf (last visited Aug. 26, 2004).

[48] Joseph Weizenbaum, *ELIZA: A Computer Program for the Study of Natural Language Communication Between Man and Machine*, 9 COMM. OF THE ACM 36, 36 (1966), *available at* http://i5.nyu.edu/~mm64 /x52.9265/january1966.html (last visited Aug. 26, 2004).

simulate a psychiatrist by mirroring the information provided to it by the client.[49] Eliza is an intellectual curiosity because, despite being rather primitive, it does meet the Turing Test, as people often believe that Eliza is "intelligent" and "human."[50] This anthropomorphization is pre-scientific, and it also shows that Turing's Test is not as objective as we might first think. Brighter people are much less likely to be "fooled" into thinking that the computer is a person. In addition to being an achievement as a successful language parser, Eliza has successfully demonstrated the limits of Turing's Test.

3. Arthur Clarke

[18] Arthur Clarke, like Alan M. Turing[51], also focused on artificial intelligence as a key definitional characteristic of the future of computer science. In the 1960s, Clarke thought that computers in 2000 would still be very big mainframes and would have vast memory banks that would allow them to be self-aware and able to interact in natural language.[52] Instead, we see today a global network of small, powerful computers that are rarely parallel processed to create a super-computer. Because existing super-computers do rely on massive parallel processing[53] and could rely on neural networks, but do not even attempt to emulate human processes,[54] the initial vision of artificial intelligence was clearly erroneous.

[19] Clarke was correct, however, in predicting a quantum leap in computational power. Computers today literally have around 60,000 times more dynamic storage capacity ("RAM") than computers of the mid-1980s.[55] Programs such as A.L.I.C.E.[56] and Babel Fish are able to

[49] *See* Michael Wallace & George Dunlop, *Eliza, Computer Therapist* (1999) (demonstrating Eliza's emulation of Rogerian psychotherapist and illusive intelligence), *at* http://www.manifestation.com/neurotoys/eliza.php3 (last visited Aug. 26, 2004).

[50] *Id*.

[51] Turing, *supra* note 45.

[52] *See generally* ARTHUR C. CLARKE, 2001: A SPACE ODYSSEY (New Am. Library 2000) (1968).

[53] *See, e.g.,* Michelle Delio, *Thinking Different, Saving Money*, WIRED NEWS, Sept. 25, 2003, at 1, *at* http://www.wired.com/news/mac/0%2C2125%2C60559%2C00.html (last visited Aug. 27, 2004) ("Cluster supercomputers link multiple single computers into one hopefully cohesive whole, a process that requires some tinkering and specialized software to ensure that the machines work together efficiently.")

[54] *See* David G. Stork, *The End of an Era*, *the Beginning of Another?*, http://www-psych.stanford.edu/~stork/HAL.IBM.html (last visited Aug. 27, 2004) (discussing the past, present and future of artifical intelligence).

[55] For example, the TRS-80 Model I had 4k RAM total (4096 bytes). Dan Olson, *Classic Computers: The Tandy TRS80* (2000), *at* http://www.rdrop.com/~dano/pc/trs80/ (last updated July 28, 2004). Additionally, the PowerMac G5 has 256 megabytes of RAM (65,536 times more RAM). The Apple Store: Power Mac G5 (2004), *at*

communicate in natural language.[57] These programs have easily over 1000 times more static memory storage, or hard drive space, than computers of the early 1990s.[58] Computers of the 1960s only had 1/1000th of the storage capacity of a computer of the 1990s.[59] Processor speed has also increased by several hundred times since the 1980s, while storage capacity has increased even more rapidly.[60] Clark's prediction was least accurate as to size and network capability. With the exception of industrial strength servers, today's computers are small and globally networked. This is because modem speed has increased from 300 bits per second ("bps") to 56,000 kbps for dial-up, and literally megabytes per second on cable.[61] Microsoft founder Bill Gates did not even expect this rapid increase.[62] These improvements are illustrated in the following table:

---

http://store.apple.com/1-800-MY-APPLE/WebObjects/AppleStore.woa/71601/wo/nI2MU30Uj7NJ2hI7OUF2XsvPMtF/1.0.9.1.0.6.25.7.11.0.3 (last visited Aug. 27, 2004).

[56] Richard S. Wallace, *From Eliza to A.L.I.C.E.*, *at* http://www.alicebot.org/articles/wallace/eliza.html (last visited Aug. 27, 2004). Alice is an example of the evolution of Eliza, an early artificial intelligence program. *Id.*

[57] *See* Altavista, Babel Fish Translator*, at* http://babelfish.altavista.com (last visited Aug. 26, 2004).

[58] *See, e.g.*, Sharon Gaudin & Kim S. Nash, *Computer Users Fight "Bloatware*,*"* (August 12, 1998), *at* http://www.cnn.com/TECH/computing/9808/12/bloatware.idg/ (last visited Sept. 13, 2004) (discussing the increasing size of applications and operating systems).

[59] For example, the IBM 1401 (a six by six foot box) was delivered with 1.4 to 16k bytes of storage. *The IBM 1401: The Replacement for Electric Accounting Machines*, *at* http://foodman123.com/h1401.htm (last visited Sept. 13, 2004). In contrast, in 1984, the original Macintosh (much smaller than the IBM 1401) was delivered with at least 128k of memory and expandable up to four megabytes. *The Macintosh*, *at* http://lowendmac.com/compact/128k.shtml (last modified Jan. 25, 2003).

[60] For example, the original Macintosh had a processor clock speed of 8 megaherz. The PowerMac G4 has a clock speed of 1.420 gigaherz, an increase of only 177.5 times when compared with the increase in RAM of 65,536 fold. Dan Knight, *Macintosh MHz Speed Chart*, LOW END MAC'S ONLINE TECH J., Feb. 18, 2003, at 1, *at* http://www.lowendmac.com/tech/cpuspeed.html (last visited Aug. 27, 2004).

[61] Jeff Keller, *Cable Modem Mania*¸ *at* http://lostworld.pair.com/cable-modem.html (last updated May 14, 1997).

[62] Nigel Meade, When Will the Trend Bend? The Value of Forecasting, Lecture before the Imperial College of London's Business School, May 20, 2003, http://www.ms.ic.ac.uk/people/faculty/lecture_notes/Meade%20Inaugural%2020-052003.pdf (last visited Aug. 27, 2004) ("1981, W. Gates, CEO Microsoft: 640k [disk storage] ought to be enough for anybody. Even Bill Gates failed to appreciate the rate at which technology was developing."); Microsoft almost went bust four years ago because Bill Gates failed to recognize the importance of the beginnings of the Internet. He had to double his efforts to make up for lost time in hopes of taming a phenomenon that in such a short space of time has become worldwide, with considerable financial impact. Abdelkebir Mezouar, Reinventing the Enterprise: A Method for Meeting the Challenge of the Future *Contribution of Abdelkebir Mezouar*, Address at the International Colloquium on Internal Auditing (June 5-6, 1997), *at* http://www.crd.co.ma/e/reinventing.asp. (last visited Oct. 4, 2004).

ADVANCES IN COMPUTER TECHNOLOGY IN THE LAST TWENTY YEARS

YEAR	RAM	Processor	Bus	Modem	Storage
1983	1k-64k[63]	3.25 mhz[64]	8 bits[65]	300 bps[66]	Cassette – 1k
2003	246meg	25 ghz (Apple G5[72])	32 bits[67] 64 bits	56 kbps[68] 10 mega bps[70]	HD: 8 gig max[69] 250 gig[71]

*Most 64-bit machines are only being used as game machines, although hackers occasionally use them as computers. The 64-bit chip will certainly migrate to the desktop.
** And upwards. (Cable modem).

[20] These hardware changes have for the most part out-paced software development.[73] While software development has also advanced rapidly, software manufacturers have had difficulty keeping pace with hardware's rapid improvements.

[21] Clarke's prediction was most accurate as to memory storage. His computer, HAL, had a memory as extensive as human memory with massive arrays of data at instant disposition.[74] Clarke was also correct about a computer's ability to process natural language. On the other

[63] For example, the ZX 80 had one K ram installed, expandable to 64k. Timex-Sinclair ZX-80, *at* http://www.oldcomputers.net (last visited Aug. 27, 2004).

[64] *Id.*

[65] For example, see the Intel 8080, *at* http://en.wikipedia.org/wiki/8080 (last modified July 16, 2004).

[66] For information on 300 bps acoustic modems, see R. Scott Perry, The Modem Dictionary, *at* http://www.ci.torrance.ca.us/city/dept/isd/mdic150.txt (last visited Aug. 27, 2004).

[67] For example, see the Motorola 68000 series (which is actually a 16/32 bit architecture), *at* http://en.wikipedia.org/wiki/68000 (last modified July 16, 2004).

[68] Keller, *supra* note 61.

[69] For statistics on contemporary computer performance, see Apple, PowerMac G5*, at* http://www.apple.com/powermac/ (last visited Aug. 27, 2004).

[70] Keller, *supra* note 61.

[71] For information on both how much hard drive storage space has expanded and the declining cost of hard drive storage (cents per megabyte), see *Historical Notes on the Cost of Hard Drive Storage Space*, *at* http://www.alts.net/ns1625/winchest.html (last modified April 17, 2004) (documenting the drop in cost per megabyte: $10,000/mb in 1956 to 8.7 cents/mb in 2004).

[72] *See generally* Wikipedia, *at* http://en.wikipedia.org/wiki/Power_Mac_G5 (last modified Aug. 23, 2004) (discussing the Power Mac G5).

[73] Vince Freeman, *Is CPU Speed Outrunning the Industry?,* HARDWARE CENTRAL, October 16, 2001, at 1, ("Software development has fallen so far behind the processor curve that virtually any current CPU (and many previous ones as well) is more than adequate for even high-level computing."), *at* http://hardware.earthweb.com/chips/article.php/904801 (last visited Oct. 4, 2004).

[74] *See* Arthur C. Clarke & Stanley Kubrick, *2001: A Space Odyssey* (1965) at C117, C142, http://www.palantir.net/2001/script.html (last visited Sept. 13, 2004).

hand, his expectation that computing would still focus on isolated, non-networked massive mainframes was inaccurate. Basically, Clarke correctly predicted that massive changes would occur, but was incorrect as to his specific predictions for what those changes would be.

[22] Thus, Clarke's prediction of a self-aware, non-trivial artificial intelligence program (HAL 9000)[75] was inaccurate. This inaccurate prediction, however, is not because the task of parsing natural language is impossible. Rather, the problem exists because attempts to achieve sentience lack commercial application and are politically unacceptable. In the 1960s, creating an artificial intelligence agent to meet Turing's Test was seen as at least an interesting research goal. However, such projects have not proven profitable. Attempts to emulate parts of intelligence via expert systems have been the recent focus of research and applications in artificial intelligence.[76]

[23] Some efforts to approach the problem of simulating human intelligence using parallel processing, i.e., distributed computing,[77] do exist. This may actually be the better way to emulate sentience. One major problem with an intelligent human-computer interface is simply determining how to parse speech. Although parsing speech may be computationally complex due to the fact that the program must take context into account, it is not impossible. By distributing the problem-solving mechanisms via the Internet, parallel processing presents the possibility of generating a reasonable simulation of human intelligence. The goal of making computers self-aware, however, raises two questions: what is "self," and what is "awareness?" Philosophers, since Descartes' discussion of solipsism[78] in *Meditations on First Philosophy*, have tried, unsuccessfully, to answer such questions. Simulating intelligence is not impossible, but, given these lingering questions and the present state of technology, computational sentience is the stuff of science fiction for now.

---

[75] Clarke purportedly chose the HAL acronym in order to be "one step ahead of IBM," reflecting his alleged belief that IBM might continue to dominate the computer market. *See* Arthur C. Clarke, *HAL's Legacy: Foreword*, http://mitpress.mit.edu/e-books/Hal/foreword/foreword1.html. Clarke, however, denies this rumor. *Id.*

[76] For an excellent synopsis of the history, possibilities, and prospects for artificial intelligence, written by one of the greatest minds in the field, see John McCarthy, *What Is Artificial Intelligence?*, *at* http://www.kurzweilai.net/articles/art0088.html?printable=1 (last visited Oct. 4, 2004).

[77] *See, e.g.*, MindPixel, *Digital Mind Modeling Project*, *at* http://www.mindpixel.com (last visited Aug. 26, 2004).

[78] Solipsism is the philosophical theory that the self is the only thing that can be known and verified. S*ee* RENÉ DESCARTES, MEDITATIONS ON FIRST PHILOSOPHY (1641), http://oregonstate.edu/instruct/phl302/texts/descartes/meditations/meditations.html (English); http://abu.cnam.fr/cgi-bin/go?medit3 (French) (last visited Aug. 26, 2004).

III. ATCA.EXE: A COMPUTER PROGRAM TO ANALYZE THE ALIEN TORT CLAIMS ACT AND THE TORTURE VICTIM PROTECTION ACT

[24] Having discussed some of the background of machine and human intelligence and the standards and measures of computation, I would like to focus now on how this background information can be applied to creating a modest computer program to formally model the law. The computer program which accompanies this paper seeks to determine whether jurisdiction exists in the United States for a claim under either the Alien Tort Claims Act ("ATCA") or Torture Victim Protection Act. If jurisdiction does exist, it then considers procedural defences. If no procedural defences exist, it then determines whether a substantive violation exists. Finally, it generates a report. To make these determinations, the program must prompt the user to supply a series of facts. The program does not, however, examine each element of a tort.[79]

[25] The ATCA program accompanying this paper essentially deduces its conclusions based on pre-programmed rules and the information supplied by the user. It does not learn new rules of production or modify its existing rules of production by deriving new rules from existing ones. The program reasons deductively, not analogically. After reaching its conclusions, it generates a report listing the reasons for its decisions.

[26] Though this program uses deductive reasoning to reach its conclusions, the common law generally reasons inductively.[80] To be exact, the common law uses inductive reasoning when arguing analogically, or by ampliation from existing cases. It uses deductive reasoning when arguing from statutes. Reasoning by analogy, i.e., inductive inference, is a very different operation than inductive ampliation.

[27] Some authors believe that analogical reasoning is impossible for a computer to model.[81] Such a position may be the result of

---

[79] The author has written a program that sketches each element of negligent torts. *See generally* Eric Engle, *Smoke and Mirrors or Science? Teaching Law with Computers - A Reply to Cass Sunstein on Artificial Intelligence and Legal Science*, 9 RICH. J.L. & TECH. 2 (2002-2003), *at* http://law.richmond.edu/jolt/v9i2/Article6.html.

[80] *See, e.g.*, FindLaw, *at* http://FindLaw.com (last visited Aug. 26, 2004) (defining common law as a body of law that is based on custom and general principles and embodied in case law and that serves as precedent or is applied to situations not covered by statute).

[81] Engle, *supra* note 79 (citing Cass R. Sunstein, Of Artificial Intelligence and Legal Reasoning 7 (Chicago Public Law and Legal Theory Working Paper No. 18, 2001), *at* http://www.law.uchicago.edu/academics/publiclaw/resources/18.crs.computers.pdf (last visited Oct. 4, 2004).

confounding inductive ampliation and analogical reasoning. Analogical reasoning and inductive ampliation are not equivalent algorithms.[82] Analogical reasoning is reasoning from one case to another similar case.[83] Ampliative induction involves examining and comparing several known cases in order to derive a new general rule, and then applying that rule to new cases.[84] Although these processes are similar, they are discrete. Unfortunately, due to a lack of rigor, clarity, or intellectual discipline, common law lawyers sometimes ignore this distinction. Understanding this nuance is one key to understanding why, and how, inductive reasoning can be modelled by computer.

[28] Developing an analogical case base would require more complex algorithms than a deductive rule base. However difficult the task may be, it is not impossible. A goal of future research is to develop an inductive solution to this problem.

[29] Computer programs that allow case-based analogical reasoning from an existing (static) case base to be applied to a new case exist today.[85] The next step will be to induce new rules of production from a dynamic case base that can evolve based on user input. Such a program would be at least three times more complex than the one presented here and, theoretically, would be able to model any area of law. The inquiry in this paper, however, is limited to an existing, well-defined area of law. Future research will develop ampliation from dynamic case bases to reason inductively as well as deductively.

[30] Neurologically, the distinction between inductive, case-based reasoning and deductive, rule-based reasoning may be a reflection of the polar differentiation in the human brain. This differentiation is not found in current CPU architecture.[86] The specialisation of different

[82] For an overview of the role of ampliation and analogy in legal inference via artificial intelligence, see *id.*

[83] For a good discussion of analogical reasoning, see John F. Sowa & Arun K. Majumdar, *Analogical Reasoning,* Proceedings of the International Conference on Conceptual Structures (July 2003), http://www.jfsowa.com/pubs/analog.htm (last visited Sept. 13, 2004).

[84] For a good discussion of ampliative reasoning, see Chris Swoyer, *Relativism*, *in* THE STANFORD ENCYCLOPEDIA OF PHILOSOPHY (Edward N. Zalta ed., 2003), *available at* http://plato.stanford.edu/entries/relativism/supplement3.html (last modified Sept. 14, 2004).

[85] The WYSH program is perhaps the best, and certainly the most available, example. *See* Eric Allen Engle, *Using WYSH Computer Programs to Model the Alien Tort Claims Act*, 6 YALE J.L. & TECH. 161 (2003).

[86] For a brief introduction to comparative neuroscience and computer science, see Craig C. Freudenrich, *How Your Brain Works*, *at* http://science.howstuffworks.com/brain.htm (last visited Aug. 27, 2004). For a discussion of a two-processor computer, see Dan Knight, *One Brain or Two?*, MAC MUSINGS, Mar. 5, 2001, *at* http://www.lowendmac.com/musings/1or2.html (last visited Aug. 27, 2004).

hemispheres, one handling logical, linear tasks such as computation, and the other handling holistic, creative tasks such as language, along with the integration of these two aspects, are what distinguish human reasoning from machine reasoning. Thus, rather than defining a test for artificial intelligence as Turing does,[87] this author would suggest that the best test of artificial intelligence would be whether the artificial intelligence can emulate both creative tasks (i.e., analogy and inductive ampliation) and linear, computational tasks (i.e., deduction), and then integrate these two processes to allow the program to solve new problems which are similar to, but not the same as, existing, solved problems. The ability to input tasks or output task results with the use of a natural language such as English would be practical, but actually would be a secondary measure of machine intelligence.

A. Academic Significance: The Use of Artificial Intelligence as a Teaching Tool

[31] The formalization of legal rules has pedagogical value because it forces legal scholars to think rigorously and systematically about the law. Formalizing the law to accurately reflect its results forces one to reconsider reductionist theories of law. Unfortunately, the majority of contemporary legal theories seem to be reductionist theories.[88] For example, legal realists argue, *simplicitur*, that the law is merely a rationalization of power.[89] Legal economists contend that the law is a function of economics.[90] Legal process is based on law as a function of public policy.[91] Each of these theories may be accurate, but each is

[87] *See supra* Part B.1.

[88] *See* Eric W. Orts, *Book Review: Simple Rules and the Perils of Reductionist Legal Thought*, 75 B.U. L. REV. 1441 (1995) (reviewing RICHARD A. EPSTEIN, SIMPLE RULES FOR A COMPLEX WORLD (1995)) (characterizing Epstein's book as "an ambitious contribution to the growing body of reductionist law-and-economics jurisprudence"); J.B. Ruhl, *Complexity Theory as a Paradigm for the Dynamical Law-and-Society System: A Wake-Up Call for Legal Reductionism and the Modern Administrative State*, 45 DUKE L.J. 849, 896 (1996) ("American legal theory has evolved along the same reductionist path that characterizes classical science. The fixation of legal theorists on predictable and 'correct' static outcomes has led naturally to a way of thinking that mirrors classical scientific thought.").

[89] Wayne Eastman, *Organization Life and Critical Legal Thought: A Psychopolitical Inquiry and Argument*, 19 N.Y.U. REV. L. & SOC. CHANGE 721, 777 (1992-1993) ("Law is politics – or ideology – not only because it embodies political value tilts and conflicting political commitments but also because law is about the rationalization of power and hierarchy.").

[90] Richard A. Posner, *Some Uses and Abuses of Economics in Law*, 46 U. CHI. L. REV. 281, 288-90 (1979).

[91] *See, e.g.,* Kevin Cuenot, *Perilous Potholes in the Path Toward Patent Law Harmonization*, 11 U. FLA. J.L. & PUB. POL'Y 101, 109 (1999) ("United States patent law is largely a function of public policy, where the United States Government rewards inventors of new, useful, and non-obvious inventions with a limited term to exclude others from making, using, or selling the invention set forth in the patent."); Robert Gatter, *Faith, Confidence, and Health Care: Fostering Trust in Medicine Through Law*, 30 WAKE FOREST L. REV. 395, 435 (2004) ("The need for health care regulators to stay

also only partially accurate. The process of formalizing law makes evident to the legal scholar the limitations of each of these theories. Further, parsing statutes and cases in a disciplined fashion reveals some of the finer shortcomings of each position. The realists' critique of formalism seems somewhat weaker if one closely studies legal doctrines such as *expressio unius*. While the realists[92] are right that some legal maxims clearly contradict each other, not all do.[93] Similarly, no one economic or policy argument can adequately explain all of the law. Legal economists who argue that "economic efficiency" determines the law ignore the problems of information costs, externalities, and non-fungible goods; these theorists instead downplay public goods, likely with political motivations. [94] While these weaknesses in legal economic theories of law may not be explicitly clear when one is parsing a statute, such weaknesses do reveal themselves implicitly when one confronts a mass of apparently conflicting rules, principles, policies, maxims, and economies. Ideally, legal programming will help scholars see the weakness in blanket generalizations. Formalization can thus encourage creative scholars to adduce theories to explain these shortcomings. The formal structure of the law is not purely or uniquely rationalization, implementation of public policy, or an economic balance.

[32] While formalization does implicitly reveal the theoretical shortcomings of contemporary legal theory, one cannot predict what new theory or theories would emerge. This is because the formalization underlying the computer program itself reflects meta-theoretical assumptions. In this regard, human intelligence is, at present, clearly superior to machine intelligence. Although humans, unlike computers, often forget facts or make mistakes, they are capable of synthesizing theories that creatively go beyond existing formal rules

---

"on message" derives from the law's expressive function. The law articulates public policy messages, announcing that a social consensus exists to endorse or condemn various behaviors."); Christopher S. Hooper, *Limiting the Use of Emissions Allowances: A Statutory Analysis of Title IV of the 1990 Amendments to the Clean Air Act*, 5 N.Y.U. ENVTL. L.J. 566, 587 (1996) ("As formulated by [Professors Henry] Hart and [Albert] Sacks, legal process theory is premised on a belief that the duty and purpose of government institutions is to enact laws which creatre dynamic and rational public policy. Legal process assumes that legislatures are composed of reasonable individuals seeking to fulfill this duty.").

[92] *See, e.g.*, Duncan Kennedy, *The Structure of Blackstone's Commentaries*, 28 BUFF. L. REV. 205, 210 (1979) (explicating the theory that the legal system masks a "fundamental contradiction" inherent in liberalism); KARL LLEWELLYN, THE COMMON LAW TRADITION 371 (Little, Brown & Co. 1960) (discussing the pairing of mutually contradictory maxims of statutory interpretation, designed to show the unfeasibility of the formalist approach).

[93] For a spirited defence of legal maxims in the field of human rights, see J. Stanley McQuade, *Ancient Legal Maxims and Modern Human Rights*, 18 CAMPBELL L. REV. 75 (1996).

[94] *See, generally*, Shanker A. Singham & D. Daniel Sokol, *Public Sector Restraints: Behind the Border Trade Barriers*, 39 TEX. INT'L L.J. 625 (2004).

of production to generate new ones. They are able to apply abductive, intuitive, and aleatory operations that are not part of the basic instruction set of a CPU. This explains some of the shortcomings of artificial intelligence.

[33] Just as legal scholars may gain insights about law-making from studying and writing computer programs about law, law professors may also find programming beneficial. Instead of seeing law as an amorphous mass of ambiguous and competing cases, statutes, and constitutions, the professor is forced to put legal chaos into some sort of order and synthesize the law into a coherent whole faster than her students.

[34] Such attempts at legal ordering are necessarily Sisyphean: with each day new cases, and with each year new statutes, appear in legal discourse. Anti-formalists will even argue that there is no legal order, that it really is just chaos.[95] Others will argue, perhaps more creatively, that the legal order is self-referential, and recursivity and autopoeisis are what define the law.[96] However, the classical enlightenment legal scholar,[97] and even her pre-enlightenment natural law counterpart, will argue that law is living logic, that it is necessarily ordered and that a chaotic law is no law at all.[98] To develop a good program, the legal scholar must put himself in the shoes of classical or enlightenment rationalism. In order to understand the program's

[95] [Antiformalists] maintain that there is no coercive social power (or at least that unrestrained coercive social power is not worse or different than coercion between individuals) or that the premises that ground searches for restraints are flawed, because individuals can make sense out of their lives only if they join communities dominated by values transcending individual desires. For some antiformalists, the law is dialogue and not coercion. For others, the law is the product of 'intuitionistic moral philosophy,' which leads to balancing. Yet other antiformalists believe that constitutional theory is (or should be) grounded in the public values of a community that give meaning to its citizens' lives.
Michael J. Gerhardt, *Critical Legal Studies and Constitutional Law*, 67 TEX. L. REV. 393, 400 (1988) (reviewing MARK TUSHNET, RED, WHITE AND BLUE: A CRITICAL ANALYSIS OF CONSTITUTIONAL LAW (1988)).

[96] *E.g.*, Gunther Teubner, *How the Law Thinks: Toward a Constructivist Epistemology of Law*, 23 LAW & SOC'Y REV. 727 (1989).

[97] *See* Immanuel Kant, *Zum ewigen Frieden* (1795), http://www.mda.de/homes/matban/de/kant-zef.html (last visited Aug. 29, 2004) ("die Vernunft vom Throne der höchsten moralischen gesetzgebenden Gewalt herab den Krieg als Rechtsgang schlechterdings verdammt" (reason, from the throne of the highest law-giving power has absolutely condemned war as a way to right)).

[98] True law is right reason in agreement with nature; it is of universal application, unchanging and everlasting . . . And there will not be different laws at Rome and at Athens, or different laws now and in the future, but one eternal and unchangeable law will be valid for all nations and all times, and there will be one master and ruler, that is, God, over us all, for he is the author of this law, its promulgator, and its enforcing judge.
MARCUS TULLIUS CICERO, DE REPUBLICA III, xxii, 33 (Clinton Walker Keyes. Ph. D., trans. 1928) (51 B.C.).

limits, the jurist must at least be aware of the radical critiques of legalism and formalism when using programs as diagnostics or predictions.

[35] The content of the program itself is really best exposed by use of the program. Try running with the program, play with it, try to "break" it (and please report any bugs to the author if you do). The program will run through some straightforward legal tests and, hopefully, reach correct conclusions in its summary report.

IV: CONCLUSION AND FUTURE PROSPECTS

[36] Although computer applications in law have expanded from simple word processing to electronic research and animated trial aids, there have been relatively few applications of artificial intelligence to law. This is partly because AI is still a developing technology due to neurological asymmetries described in this paper. Expert systems generally perform limited tasks reasonably well, but AI general systems have not yielded much success. Further, AI, unlike other areas of programming, has not yet yielded profits.[99] However, AI algorithms do increasingly figure in commercial programs such as speech recognition and machine translation.[100] AI can be useful not only as a tool to teach legal reasoning to law students but also as a checklist for legal practitioners. Future research will hopefully yield new types of microprocessors that will be developed for AI applications.

SOURCE CODE

```
on yesit theVal
  global X
  if theVal = "Yes" then put true into X else put false into X
end yesit

on mouseUp
  global x
  put false into immunity
  answer "JURISDICTIONAL INQUIRY"
```

[99] Department of Commerce, Bureau of Industry and Security, *Artificial Intelligence*: *Critical Technology Assessment of the U.S. Artificial Intelligence Industry,* http://www.bxa.doc.gov/DefenseIndustrialBasePrograms/OSIES/DefMarketResearchRpts/ArtificialIntell1994.html (last visited Aug. 29, 2004) ("AI is still an emerging technology. Continued research is essential to its long-term development. While many AI techniques have attained commercial viability, improvements are needed to further expand markets. In other cases, such as machine learning and robotics, major research remains undone.").

[100] Wikipedia, *Artificial Intelligence*, *at* http://en.wikipedia.org/wiki/Artificial_intelligence (last modified Aug. 23, 2004).

```
  --RULE general jurisdiction PROVIDES
  put "" into cd fld 1
  --JURISDICTIONAL INQUIRY
  answer "Did defendant have systematic and continuous contacts with the forum
state?" with "Yes" or "No"
  yesit it
  put x  into systematicandcontinuous
  IF systematicandcontinuous = true THEN
    put true into gj
    put "General jurisdiction exists because the defandant has systematic and
continuous contacts with the forum state." after cd fld 1
  ELSE
    put false into gj
    put "General jurisdiction does not exist: defandant does not have systematic and
continuous contacts with the U.S. state." after cd fld 1
  end if
  put return after cd fld 1
  put return after cd fld 1
  answer "Did the tort occur in the U.S.?" with "Yes" or "No"
  yesit it
  put x  into tortoccurredinUS
  answer "Did the tort have effects in the U.S.?" with "Yes" or "No"
  yesit it
  put x  into torthaseffectsinUS
  if gj = false then
    answer "Did defendant have minimum contacts with the forum state?" with "Yes"
or "No"
    yesit it
    put x  into minimumcontacts
    if minimumcontacts = true then put true into sj
  end if
  IF ((tortoccurredinUS OR torthaseffectsinUS) AND sj = true) THEN
    put true into pj
    put "Personal jurisdiction exists because specific jurisdiction exists "  after cd fld 1
    put "because the defendant has minimum contacts with the forum and the tort
occurred in or had effects in the U.S." & return after cd fld 1
    put return after cd fld 1
  end if
  IF gj = true then put true into pj
  IF pj = true then put true into ipj
  --RULE law of nations PROVIDES
  answer "Did the tort arise out of piracy?" with "Yes" or "No"
  yesit it
  put x  into piracy
  answer "Did the tort arise out of genocide?" with "Yes" or "No"
```

```
  yesit it
  put x  into genocide
  answer "Did the tort arise out of an illegal war of aggression?" with "Yes" or "No"
  yesit it
  put x  into war
  answer "Did the tort arise out of a war crime?" with "Yes" or "No"
  yesit it
  put x  into warcrime
  answer "Did the tort arise out of the slave trade?" with "Yes" or "No"
  yesit it
  put x  into slavetrade
  answer "Did the tort arise out of torture?" with "Yes" or "No"
  yesit it
  put x  into torture
  put "Did the tort arise out of a conspiracy to commit piracy, genocide," into y
  put "an illegal war of aggression, a war crime, the slave trade or torture?" after y
  answer y with "Yes" or "No"
  yesit it
  put x  into conspiracy
  IF piracy = true or slavetrade = true or genocide = true OR war = true OR warcrime
= true OR conspiracy = true THEN
    put true into lawofnations
    put "The tort is a violation of the law of nations: " & return after cd fld 1
    if genocide then put "Because genocide is a jus cogens violation. " after cd fld 1
    if war then put "Because planning or executing illegal aggressive wars is illegal
under international law. " after cd fld 1
    if warcrime then put "Because war crimes are a viation of jus cogens. " after cd fld
1
    if slavetrade then put "Because the slave trade is a violation of jus cogens. " after
cd fld 1
    if torture then put "Because torture is a violation of a jus cogens. " after cd fld 1
    if conspiracy then put "Because conspiracy to commit a substantive violation"
after cd fld 1
    put " of the law of nations is illegal under international law. " after cd fld 1
  ELSE
    put false into lawofnations
    put "The tort is not a violation of the law of nations." & return after cd fld 1
  end if
  answer "Was the tort also a violation of a U.S. treaty?" with "Yes" or "No"
  yesit it
  put x  into treatyviolation
  if treatyviolation then put "A tort in violation of a U.S. treaty will support an ATCA
claim." after cd fld 1
  put return after cd fld 1
  answer "Does the defendant reside in the U.S.?" with "Yes" or "No"
```

```
 yesit it
 put x  into defendantResidesInUS
 if ((tortoccurredinUS OR torthaseffectsinUS) and defendantResidesInUS) then put
true into SJ
 if SJ = true then
  put return after cd fld 1
  put "Specific jurisdiction exists: the tort occurred U.S. or had effects in the U.S.
and the defendant resides in the U.S." after cd fld 1
  --RULE general jurisdiction PROVIDES
  IF systematicandcontinuous
  THEN
   put true into gj
   put "General jurisdiction exists because the defendant has systematic and
continuous contacts with the United States." after cd fld 1
  ELSE
   put false into gj
   put "General jurisdiction does not exist" after cd fld 1
   put " because the defendant does not have systematic and continuous contacts
with the United States." after cd fld 1
  end if
 end if
 put return after cd fld 1
 put return after cd fld 1
 --RULE in personam jurisdiction PROVIDES
 IF sj = true OR gj = true THEN
  put true into ipj
  put "Personal jurisdiction in personam exists because special jurisdiction exists or
general jurisdiction exists. " after cd fld 1
 ELSE
  put false into ipj
  put "Personal jurisdiction in personam does not exist because special jurisdiction
or general jurisdiction do not exist. "  after cd fld 1
  put "(Try to get personal jurisdiction in rem or quasi in rem)" & return after cd fld
1
 end if
 put return after cd fld 1
 put return after cd fld 1
 answer "Is the plaintiff an alien?" with "Yes" or "No"
 yesit it
 put x  into plaintiffAlien
 --RULE original jurisdiction PROVIDES
 IF (gj = true OR pj = true) AND plaintiffalien = true AND (lawofnations = true OR
treatyviolation = true) THEN
  put true into oj
```

```
    put "Original jurisdiction before U.S. Federal courts exists under the Alien Tort
Claims Act" & return after cd fld 1
   ELSE
    put false into oj
    put "Original jurisdiction before U.S. Federal courts under the Alien Tort Claims
Act does not exist." & return after cd fld 1
   END IF
   put return after cd fld 1
   put return after cd fld 1
   if lawofnations = false then
    put "There is no original jurisdiction under the ATCA " after cd fld 1
    put "because there is no violation of the law of nations or a U.S. treaty." & return
after cd fld 1
   end if
   if (gj = false AND pj = false) then
    put "There is no original jurisdiction under the ATCA "  after cd fld 1
    put "because there is neither general jurisdiction nor personal jurisdiction." &
return after cd fld 1
   end if
   if plaintiffAlien then put "There is no original jurisdiction under the ATCA because
the defendant is not an alien." & return after cd fld 1
   put return after cd fld 1
   put "Does this case involve a federal question such as admiralty," into y
   put "federal taxation, monetary laws, the SEC civil rights claims, " after y
   put "or claims involving U.S. foreign policy?" after y
   answer y with "Yes" or "No"
   yesit it
   put x  into fedqn
   if fedqn = true then put "Federal question jurisdiction exists." & return after cd fld 1
   else
    put "Federal question jurisdiction does not exist." & return after cd fld 1
   end if
   answer "Are the plaintiff and defendant of diverse citizenship (i.e. two different
states or different federated states)" with "Yes" or "No"
   yesit it
   put x  into diversity
   put return after cd fld 1
   --RULE specific jurisdiction PROVIDES
   IF (oj = true OR fedqn = true OR diversity = true) THEN
    put true into smj
    if smj = true then put "Subject matter jurisdiction exists " & return after cd fld 1
    put "either due to original jurisdiction, federal question, or diversity of
citizenship."  after cd fld 1
   else
    put "Subject matter jurisdiction does not exist because " after cd fld 1
```

```
    put "there is neither original jurisdiction under the ATCA nor federal question
jurisdiction nor diversity of citizenship." after cd fld 1
  end if
  put return & return after cd fld 1

  --RULE federal jurisdiction PROVIDES
  IF smj = true AND pj = true THEN put true into fj  ELSE put false into fj
  if fj = true then
    put "Federal jurisdiction exists " after cd fld 1
    put "because subject matter jurisdiction and personal jurisdiction exist." & return
after cd fld 1
  else
    put "Federal jurisdiction does not exist "  after cd fld 1
    put "because subject matter jurisdiction and personal jurisdiction do not exist." &
return after cd fld 1
  end if
  put return after cd fld 1
  IF fj = false then
    put false into liable
    put return after cd fld 1
    put "There can be NO LIABILITY because there is no federal jurisdiction." &
return after cd fld 1
  else
    put "Federal jurisdiction exists, liability may or may not exist under substantive
law." & return after cd fld 1
  end if
  put return after cd fld 1
  answer "SUBSTANTIVE INQUIRY: ATCA/TVPA"
  answer "Is the defendant an individual?" with "Yes" or "No"
  yesit it
  put x into defendantindividual
  answer "Was the victim a victim of torture?" with "Yes" or "No"
  yesit it
  put x  into torture
  answer "Was the victim a victim of extra-judicial killing" with "Yes" or "No"
  yesit it
  put x into murder
  --TVPA
  IF defendantindividual is true AND (torture is true OR murder is true) then
    answer "Was defendant acting under actual authority of the state?" with "Yes" or
"No"
    yesit it
    put x  into stateactor
    answer "Was defendant acting under apparent authority of the state?" with "Yes"
or "No"
```

```
    yesit it
    if stateaction is false then put x into stateactor
    if stateaction is false then
      --RULE color of law PROVIDES
      answer "Was the defendant non state actor providing a public function?" with
"Yes" or "No"
      yesit it
      if stateactor = false then put x into stateactor
      answer "Was there a close nexus of state and non state actor connections?" with
"Yes" or "No"
      yesit it
      if stateactor = false then put X into stateactor
      answer "Was the private sector compelled by the state to act as it did?" with
"Yes" or "No"
      yesit it
      if stateactor = false then put X into stateactor
      answer "Was the action undertaken jointly with the state and non-state actor?"
with "Yes" or "No"
      yesit it
      if stateactor = false then put X into stateactor
    end if
    if stateactor = true then put true into coloroflaw
    if coloroflaw is true then
      put "Defendant is liable for torture under the Torture Victim's Prevention Act." &
return after cd fld 1
      put "Defendant may be exonerated however because of jurisdictional or
procedural defenses! (See this report infra)." after cd fld 1
    else
      put return after cd fld 1
      put "Defendant is not liable for torture under the Torture Victim's Prevention
Act." & return after cd fld 1
    end if
  else
    put return after cd fld 1
    put "Defendant is not liable for torture under the Torture Victim's Prevention Act."
& return after cd fld 1
  end if
  put return after cd fld 1
  If (plaintiffAlien and (lawofnations or treatyviolation)) then
    put "Original jurisdiction before U.S. Federal courts exists under the Alien Tort
Claims Act."  after cd fld 1
    put "Thus defendant may be tried in the U.S. "  after cd fld 1
    put "Defendant may be exonerated however because of jurisdictional or procedural
defenses! (See this report infra)." after cd fld 1
    put true into ATCA
```

```
  ELSE
    put "Original jurisdiction before U.S. Federal courts under the Alien Tort Claims
Act does not exist. " after cd fld 1
    put "Defendant may be not tried in the U.S. under the Alien Tort Claims Act."
after cd fld 1
    put false into ATCA
  END IF
  put return & return after cd fld 1
  answer "Is the defendant an individual?" with "Yes" or "No"
  yesit it
  put x into defendantindividual
  answer "Was the victim a victim of torture?" with "Yes" or "No"
  yesit it
  put x into torture
  answer "Was the victim a victim of extra-judicial killing" with "Yes" or "No"
  yesit it
  put x into murder
  if torture = true then put "Liability might (or might not) exist under the TVPA
because the plaintiff was tortured."  & return  after cd fld 1
  if murder = true then
    put "Liability might (or might not) exist under the TVPA " after cd fld 1
    put "because the plaintiff was the victim of extrajudicial killing."  & return  after
cd fld 1
  end if
  if (torture = false and murder = false) then
    put return after cd fld 1
    put "There is NO LIABILITY under the TVPA because there was no torture or
extra judicial killing."  & return  after cd fld 1
  end if
  put return after cd fld 1
  if defendantindividual = false then
    put return after cd fld 1
    put "There is NO LIABILITY under the TVPA because the defendant is not an
individual." & return after cd fld 1
  end if
  if defendantindividual = true then
    put "Liability might (or might not) exist under the TVPA because the plaintiff was
an individual."  & return  after cd fld 1
  end if
  --TVPA
  IF defendantindividual is true AND (torture is true OR murder is true) then
    answer "Was defendant acting under actual authority of the state?" with "Yes" or
"No"
    yesit it
    put x  into stateactor
```

```
    put x into stateaction
    if stateactor = true then
      put "Defendant is a state actor because " after cd fld 1
      put "they acted under actual authority of the state and thus may be liable under
the TVPA" & return after cd fld 1
    end if
    answer "Was defendant acting under apparent authority of the state?" with "Yes"
or "No"
    if stateactor is false then
      yesit it
      put x into stateactor
    end if
    if (stateaction = false and stateactor = true) then
      put "Defendant is a state actor because " after cd fld 1
      put "they acted under apparent authority of the state and thus may be liable under
the TVPA" & return after cd fld 1
      put true into stateaction
    end if
    if stateaction is false then
      --RULE color of law PROVIDES
      answer "Was the defendant non state actor providing a public function?" with
"Yes" or "No"
      yesit it
      put x into stateactor
      put true into pubfun
      if pubfun = true then
        put "Defendant though a non-state actor may be regarded as a state actor " after
cd fld 1
        put "for it acted under color of state law by exercising a public function." &
return after cd fld 1
      end if
      answer "Was there a close nexus of state and non state actor connections?" with
"Yes" or "No"
      yesit it
      if stateactor = false then put x into stateactor
      put true into nexus
      if nexus = true then
        put "Defendant though a non-state actor may be regarded as a state actor " after
cd fld 1
        put "for defendant acted under color of state law because of a close nexus of
state and non state connections." & return after cd fld 1
      end if
      answer "Was the private sector compelled by the state to act as it did?" with
"Yes" or "No"
      yesit it
```

```
      put x into compelled
      if stateactor = false then
        put x into stateactor
        put x into compelled
      end if
      if compelled = true then
        put "Defendant though a non-state actor may be regarded as a state actor " after
cd fld 1
        put "for it acted under color of state law because it was so compelled by the
state." & return after cd fld 1
      end if
      answer "Was the action undertaken jointly with the state and non-state actor?"
with "Yes" or "No"
      if stateactor = false then
        yesit it
        put x into stateactor
      end if
      put true into joint
      if joint = true then
        put "Defendant though a non-state actor may be regarded as a state actor " after
cd fld 1
        put "for it acted under color of state law by working jointly with the state." &
return after cd fld 1
      end if
    end if
    if stateactor = true then put true into coloroflaw
    if coloroflaw is true then
      put "Defendant is liable for torture under the Torture Victim's Prevention Act."
after cd fld 1
      put " because the defendant acted under color of law." & return after cd fld 1
      put true into tvpa
    else
      put return after cd fld 1
      put "Defendant is not liable for torture under the Torture Victim's Prevention
Act." after cd fld 1
      put " because the defendant did not act under color of state law." & return after cd
fld 1
      put false into tvpa
    end if
  else
    put return after cd fld 1
    put "Defendant is not liable for torture under the Torture Victim's Prevention Act."
after cd fld 1
    put " because the defendant did not act under color of law." & return after cd fld 1
    put false into TVPA
```

```
  end if
  if tvpa = false and atca = false then
    put return after cd fld 1
    put "The defendant is not liable under either the ATCA or the TVPA." after cd fld
1
    put "The jurisdiction and report are presented to illustrate the procedural and
substantive issues." after cd fld 1
    put return after cd fld 1
  end if
  put return after cd fld 1

  answer "PROCEDURAL DEFENSES"
  answer "Has plaintiff exhausted all their remedies overseas?" with "Yes" or "No"
  yesit it
  put x into exhaust
  if exhaust =  false then
    answer "Would it be futile to exhaust the remedies due to political bias or corrupt
process?" with "Yes" or "No"
    yesit it
    put x into futile
    if futile then put true into exhaust

    if exhaust = false then
      if futile = true then
        put "Although plaintiff has not exhausted all available remedies they will be
excused from doing so because of futility." after cd fld 1
        put return after cd fld 1
      else
        put "Plaintiff has not exhausted all their remedies and is not excused from doing
so (absence of futility)." after cd fld 1
        put "Thus the court will find NO LIABILITY because of the failure to exhaust
local remedies." & return after cd fld 1
        put return after cd fld 1
      end if
    else
      put "Because plaintiff has exhausted all their foreign " after cd fld 1
      put "remedies in the locus delicti their case can be heard before the U.S. court."
after cd fld 1
      put return after cd fld 1
    end if
  end if



  put return after cd fld 1
```

```
  --RULE FSIA PROVIDES

  answer "Is the defendant a foreign government?" with "Yes" or "No"
  yesit it
  put x into gov
  if gov = true then
    answer "Did the foreign government expressly waive its immunity?" with "Yes" or
"No"
    yesit it
    put x into waiver
    if waiver = true then
      put "Government has waived it's immunity and can be liable " after cd fld 1
      put "despite the Foreign Sovereign Immunities Act." after cd fld 1
    else
      put "Government has not waived its immunity and may (or may not) " after cd fld
1
      put "be shielded from liability by the Foreign Sovereign immunities Act. " after
cd fld 1
    end if
    answer "Is the act commercial (acto iure gestionis) or governmental (acto iure
imperii)" with "Commercial" or "Governmental"
    put it into acto
    if acto ="Commercial" then
      put "Commercial acts of the sovereign are generally excepted from the immunity
presumed under the FSIA. " after cd fld 1
    end if
    IF waiver = true OR acto = "Commercial" then
      put false into gi
      put "Thus, no governmental immunity under the FSIA will be found." & return
after cd fld 1
    else put true into gi
  end if



  if (not gov) then
    --RULE head of state immunity PROVIDES
    answer "Is the defendant a head of state or ranking minister?" with "Yes" or "No"
    yesit it
    put x into hos
    if hos = true then
      answer "Did the tortious act occur during the term of office of the head of state?"
with "Yes" or "No"
      yesit it
```

```
      put x into duringoffice
      if duringoffice then
        put "Except for jus cogens violations defendant head of state is absolutely
immune for torts committed while in office." after cd fld 1
        put return after cd fld 1
      else
        answer "Is the defendant head of state still in office?" with "Yes" or "No"
        yesit it
        put x into stillinoffice
        if stillinoffice then
          put "Defendant head of state will be immune during their term of office for this
tort." & return after cd fld 1
          put "Exception: jus cogens violations need not be granted immunity" after cd
fld 1
          put " though no state is obligated to remedy jus cogens violations." & return
after cd fld 1
        end if
        if (duringoffice = true or stillinoffice = true) then
          put true into immunity
        else
          put "Defendant will not be immune for the tort committed prior to their term of
office" after cd fld 1
          put " because the defendant head of state is no longer in office." & return after
cd fld 1
        end if
      end if
    end if


    if hos = false then
      answer "Is the defendant a government official other than a head of state or
minister?" with "Yes" or "No"
      yesit it
      put x into govoff
      if govoff = true then answer "Did the tortious act occur during the official's term
of office?" with "Yes" or "No"
      yesit it
      put x into duringoffice
      answer "Was the act an official act?" with "Yes" or "No"
      yesit it
      put x into officialact
      if (officialact=true and duringoffice=true) then
        put true into immunity
        put "Defendant governmental official will be immune for this tort " after cd fld 1
```

```
      put "because the tort occurred in the exercise of their official duties during their
term of office." & return after cd fld 1
      put "Exception: jus cogens violations are need not be granted immunity" after cd
fld 1
      put " though no state is obligated to remedy jus cogens violations." & return
after cd fld 1
    else put false into immunity
   end if
  end if

  put return after cd fld 1


  --RULE statute of limitations PROVIDES

  answer "How much time has passed since the tort occurred in years?" with ">10
years" or "<10 years"
  put it into torttime
  answer "Will equitable considerations of substantial fairness and justice stop the
statute of limitations from running?" with "Yes" or "No"
  yesit it
  put x into equitabletolling

  if tortTime = ">10 years" AND equitableTolling = false THEN
    put "Claim is time barred." & return after cd fld 1
    put true into sol
    put false into liable
  else
    put "The claim is not time barred. " after cd fld 1
    if torttime = ">10 years" then put "Fewer than 10 years have passed since the tort
occurred. "  after cd fld 1
    if equitableTolling then put "The statute of limitations has been tolled (stopped) by
equitable considerations." After cd fld 1
    put return after cd fld 1
    put false into sol

  end if

  put return after cd fld 1


  --RULE forum non conveniens PROVIDES

  Answer "Would this forum be oppressive to the defendant due to costs of litigation
and travel expenses?" with "Yes" or "No"
```

```
  yesit it
  put x into forum

  answer "Is this forum inconvenient because it is far from witnesses and the scene of
the transaction?" with "Yes" or "No"
  yesit it
  put x into inconvenient

  answer "Would another forum be the better place of litigation due to proximity or
state interests?" with "Yes" or "No"
  yesit it
  put x into non


  put false into fnc
  If Forum  and (non or inconvenient) then put true into fnc
  If Non and inconvenient then put true into FNC



  --RULE act of state doctrine PROVIDES
  answer "Did the act occur or within the territory of another sovereign?" with "Yes"
or "No"

  yesit it
  put x into terr
  answer "Did the act involve a decision by that foreign sovereign in connection with
its own territory?" with "Yes" or "No"
  yesit it
  put x  into s

  if (s = true and terr = true) then put true into actofstate else put false into actofstate



  --RULE political question PROVIDES


  answer "Was this legal question committed to decision by a coordinate branch of
government (the legislature or executive)?" with "Yes" or "No"
  yesit it
  put x into coordinate
```

```
  answer "Are there objective judicially manageable standards by which an impartial
decision can be made?" with "Yes" or "No"
  yesit it
  put x  into judicialstandards

  answer "Is the supposedly legal question in fact fundamentally a policy
determination?" with "Yes" or "No"
  yesit it
  put x  into policydetermination

  answer "Would a court decision require unquestioning adherence to a standard
dictated by another branch of government?" with "Yes" or "No"

  yesit it
  put x into unquestioningadherence

  answer "Would a court decision risk embarassment and contradiction with
coordinate branches of government?" with "Yes" or "No"

  yesit it
  put x into potentialembarassment

  IF (coordinate OR judicialstandards OR policydetermination OR
unquestioningadherence OR potentialembarassment) THEN
    put true into pq
  ELSE put false into  pq

  --RULE comity PROVIDES
  answer "Do principles of fairness indicate that a foreign court would be more
appropriate?" with "Yes" or "No"
  yesit it
  put x into fairn
  answer "Does judicial economy indicates that a foreign court would be more
appropriate?" with "Yes" or "No"
  yesit it
  put x into judecon
  if (fairn or judecon) then put true into  comity ELSE put false into comity



  if gi = true then put "NO LIABILITY due to governmental immunity" & return &
return after cd fld 1

  if immunity then put "NO LIABILITY due to official immunity" & return & return
after cd fld 1
```

```
 if sol then put "Statute of limitations has run out. Claim will be time barred." &
return  & return after cd fld 1

 If fnc then
   put "The court will probably not hear the case because it is an inconvenient forum,
namely: " after cd fld 1

   if forum then put "This forum would be oppressive to the defendant. " after cd fld
1
   if non then put "This forum would be inconvenient because witnesses and the
locus of the action are far from this court. " after cd fld 1
   if inconvenient then put "This forum would be inconvenient because " after cd fld
1
   put " another forum would be better due to proximity or state interests. " after cd
fld 1
   put return  & return after cd fld 1
 else
   put "The doctrine of forum non conveniens probably does not apply to this case
and should not bar the action" after cd fld 1
   if forum then put " even though forum might be oppressive to the defendant" after
cd fld 1
   if non then put " even though witnesses and the locus of the action are far from this
court" after cd fld 1
   if inconvenient then put " even though another forum would be better due to
proximity or state interests" after cd fld 1
   put "." & return  & return after cd fld 1
 end if

 IF actofstate then
   put "The court will probably not hear the case due to the Act of State doctrine. "
after cd fld 1
   put "The act occured within the territory of another sovereign and " after cd fld 1
   put "involved a decision by that foreign sovereign in connection with its own
territory." after cd fld 1
   put return & return after cd fld 1
 end if

 if pq then
   put "The court will not hear the case due to the political question doctrine
because:" after cd fld 1
   if coordinate then put " This issue was committed to decision by a coordinate
branch of government." after cd fld 1
   if judicialstandards then put " There are objective judicially manageable standards
by which an impartial decision can be made." after cd fld 1
```

```
    if policydetermination then put " The supposedly legal question is in fact
fundamentally a policy determination." after cd fld 1
    if unquestioningadherence then put " A court decision would require
unquestioning adherence" after cd fld 1
    put " to a standard dictated by another branch of government." after cd fld 1
    if potentialembarassment then put " A court decision risk embarassment and
contradiction with coordinate branches of government." after cd fld 1
    put return & return after cd fld 1
  end if

  if comity then
    put "The court may well choose not to hear the case due to comity a discretionary
prudential rule of jurisdiction. " after cd fld 1
    if fairn then put "Principles of fairness indicate that a foreign court would be more
appropriate. " after cd fld 1
    if judecon then put "Judicial economy indicates that a foreign court would be more
appropriate." after cd fld 1
    if fairn and judecon then put " Together both these facts just about guarantee that
the court will apply comity." after cd fld 1
  end if
  -- the results...  put return & tvpa && atca && liable after cd fld 1
end mouseup
```